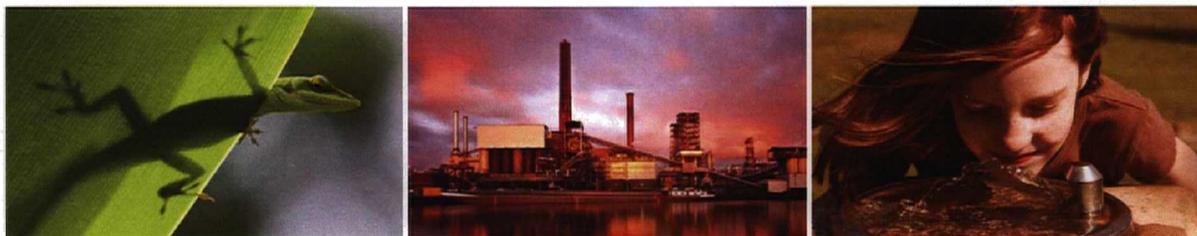


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Pilot Study Sampling Plan
OU4: Off-Site Soils
DePue Site
DePue, Illinois

US EPA RECORDS CENTER REGION 5



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Prepared for:
Illinois Environmental Protection Agency

On behalf of:
The DePue Group

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Date:
October 2013

Project Number:
21-12046C

RECEIVED

OCT 30 2013

IEPA-BOL-FSRS



Contents

	Page	
1	Introduction	1
1.1	General	1
1.2	Objectives	1
2	Proposed Scope of Work	3
2.1	Access Agreements	3
2.2	Property Evaluation	3
2.3	Soil Sample Collection Procedures	4
2.4	Analytical Methods	6
2.5	Soil Sieving	6
2.6	Hexavalent Chromium Evaluation	7
3	Schedule and Reporting	8
3.1	Schedule	8
3.2	Reporting	8
4	References	9

List of Figures

- Figure 1-1: DePue Area Vicinity
- Figure 2-1: Site Map
- Figure 2-2: Potential Off-Site Soil Sampling Locations, Northwest Subarea
- Figure 2-3: Potential Off-Site Soil Sampling Locations, West Subarea
- Figure 2-4: Potential Off-Site Soil Sampling Locations, South Subarea
- Figure 2-5: Potential Off-Site Soil Sampling Locations, East Subarea
- Figure 2-6: Residential Yard Soil Sampling Scenarios
- Figure 2-7: Proposed OU3 Sample Locations for Hexavalent Chromium Evaluation

List of Appendices

- Appendix A: Access Agreement
- Appendix B: Property Evaluation Form
- Appendix C: Field Sampling Plan
- Appendix D: QAPP Addendum

Acronyms and Abbreviations

bgs:	below ground surface
CAMU:	Corrective Action Management Unit
Design Study:	Off-Site Soils Design Study
FSP:	Field Sampling Plan
FS:	Feasibility Study
FPSA:	Former Plant Site Area
HCOPCs:	Human Health Constituents of Potential Concern
IEPA:	Illinois Environmental Protection Agency
LBP:	lead-based paints
mg/kg:	milligrams per kilograms
OU:	operable unit
Plan:	Pilot Study Work Plan
QAPP:	Quality Assurance Project Plan
RAL:	Removal Action Limit
RI:	Remedial Investigation
RIWP:	Phase I Remedial Investigation Work Plan
USEPA:	United States Environmental Protection Agency
XRF:	X-ray fluorescence

1 Introduction

1.1 General

This document presents a Pilot Study Sampling Plan (the “Plan”) for the operable unit (OU) OU4: Off-Site Soils Study Area surrounding the DePue site. The term “off-site” is used with respect to the New Jersey Zinc/Mobil Chemical facility property, referred to as the “site” or as the Former Plant Site Area (FPSA). The DePue site is located in the Village of DePue, Bureau County, Illinois (Figure 1-1). In May 2004, the DePue Group submitted to the Illinois Environmental Protection Agency (IEPA) a Phase I Remedial Investigation Work Plan (RIWP) that presented a scope of work for a Phase I Remedial Investigation (RI) and baseline human health risk assessment for the Village of DePue surrounding the FPSA. The DePue Group subsequently received comments on the Phase I RIWP from the IEPA. The DePue Group submitted a revised Phase I RIWP in January 2005. On March 2, 2005, the DePue Group received comments on the revised Phase I RIWP from IEPA. Pursuant to these comments, the DePue Group conducted a Removal Action Limit (RAL) investigation in lieu of a Phase I RI. Based on IEPA’s review of the RAL Report, and subsequent discussions between IEPA and the DePue Group, the DePue Group submitted an Off-Site Soils Design Study (the “Design Study”) in March 2012 (ENVIRON, 2012), which is in the process of being finalized.

The Design Study, related IEPA comments, and DePue Group responses to IEPA comments have summarized the following:

- The existing off-site data including the historical off-site soil data, the 2005 RAL assessment data, and the off-site reconnaissance observations presented in the September 2011 Revised RAL Assessment Report (ENVIRON, 2011).
- The proposed soil sampling and analytical methods, the approaches that will be used to evaluate the nature and extent of potential site-related material and constituents, the potential transport and migration pathways, and the potential human and ecological exposure pathways and associated risks.
- The proposed bright-line soil criteria to be used to identify properties requiring remediation and the methods used to calculate the bright-line criteria.
- The evaluation of potential remedial alternatives and the proposed property remediation activities and methods.

1.2 Objectives

Rather than performing a RI followed by a Feasibility Study (FS) to evaluate remedial options, the DePue Group prepared a Design Study with a goal to shorten the timeframe between sample collection and remedial action, if necessary, within OU4. Because RI data is not available, the evaluation of remedial alternatives presented in the Design Study and in subsequent correspondence between IEPA and the DePue Group was based on extrapolating data obtained from 17 properties evaluated as part of the RAL to the entire OU4 area which includes approximately 750 residential properties, special use areas, and ecological habitat areas in OU4. Therefore, it was necessary to make several assumptions for estimating the number of properties that may require excavation, the volume of soil that may be generated, the volume of soil that may require placement in the existing Corrective Action Management Unit

(CAMU), and associated remedial costs. As a result, there is considerable uncertainty regarding the evaluation of alternatives; therefore, the DePue Group proposes the completion of a Pilot Study for OU4 soils that is designed to:

- Obtain additional soil data to focus the full-scale soil investigation program,
- Determine the generalized depth of potential plant-related material,
- Determine if the lead concentration in the fine soil fraction is different from the lead concentration in the total sample,
- Determine if concentrations in the 0 to 1-inch soil samples are similar to concentrations in the 1 to 6-inch sample, thereby eliminating the need for collection of the 0 to 1-inch sample during implementation of the Design Study. If the data allow for eliminating the 0 to 1-inch sample interval, future sampling will be conducted from 0 to 6-inches,
- Determine the ability to refine the list of Human Health Constituents of Potential Concern (HCOPCs),
- Determine if chromium is present in the hexavalent or trivalent forms,
- Determine the adequacy of X-ray fluorescence (XRF) technology and define the terms of its use during implementation of the Design Study,
- Understand the likely scope of the full-scale soil remediation program,
- Gain experience with working in the community, and
- To evaluate the practicality of the assumptions and plans outlined in the Design Study.

2 Proposed Scope of Work

To further evaluate soils within the OU4 Study Area, the DePue Group will attempt to obtain access and soil samples from 30 to 50 properties distributed throughout the Village. As outlined in the Design Study, the OU4 Study Area is divided into five subareas as shown on Figure 2-1. To evaluate the number of Pilot Study soil borings proposed for each subarea, the percentage of the approximate number of homes in each subarea (excluding the RAL sample locations) compared to the total number of homes in the OU4 Study Area was calculated. The resulting percentage was then multiplied by the number of potential available Pilot Study sample locations (i.e., 50) to determine the number of proposed Pilot Study soil borings in each subarea. The Northeast Subarea mainly includes agricultural and forested land; therefore, the area was not included in the evaluation. Based on the evaluation, the following number of Pilot Study sample locations are proposed:

- Northwest Subarea: 6 sample locations
- West Subarea: 14 sample locations
- South Subarea: 18 sample locations
- East Subarea: 12 sample locations

The properties selected for sampling in each subarea will be determined randomly. Each residential or residential-like property in a subarea will be assigned a property number. The “randbetween” function in Microsoft Excel will be used to randomly select the property numbers based on the division for each subarea presented above. If a randomly selected property owner chooses not to participate in the Pilot Study, a request for participation will be made to a nearby property owner. The subareas are shown on Figures 2-2 through 2-5.

2.1 Access Agreements

Property owners asked to participate in the Pilot Study will be requested to grant access to the DePue Group, IEPA, the U.S. Environmental Protection Agency (USEPA), and their representatives for sampling. A copy of the access agreement to be used in the Pilot Study is included in Appendix A. In the event that the owner does not grant access, the DePue Group will request access from a nearby property owner.

2.2 Property Evaluation

Prior to collecting soil samples on a property, a property inspection checklist (Appendix B) will be completed as outlined in the Design Study and subsequent correspondence with IEPA. The property inspection checklist includes information regarding the home and the property. The following information will be obtained, as available, during the evaluation: property address; year of construction; type of construction; exterior construction material (brick, siding [painted or factory finish such as vinyl siding]; stucco, etc.); number of stories; roof overhead distance; distance from ground to soffit; presence and location of gutters, downspouts, and drainage swales; ground surface grading and drainage with respect to the residence; identification of painted surfaces (exterior trim, window trim, porch, etc.); condition of paint (chipping, peeling, deteriorated, etc.); digital photographs of the residence and notable features; drip zone features (presence of vegetation, mulch, bare soil, paint chips, etc.); location of gardens, junk or wood

piles, burning barrels, play areas, etc.; the presence of plant-related fill material; and a drawing of the house and property in plain view with the above features and sample locations. Additionally, the location of underground utilities will be located by the Illinois One-Call System, JULIE.

2.3 Soil Sample Collection Procedures

Soil samples will be obtained from each of the proposed Pilot Study sample locations where access is granted by the property owner. Soil sampling will be conducted according to the following protocol, as defined in the Design Study and approved by IEPA:

Composite Soil Samples

For residential lots with a total yard surface area less than or equal to 5,000 square feet, a five-point composite sample will be obtained from each of the front yard and the back yard. If the size of a contiguous side yard is at least approximately one-third of the total yard area, an additional five-point composite sample will be obtained from the side yard. For lots with a total yard area of greater than 5,000 square feet, the lot will be divided into four quadrants of the same approximate surface area. The two quadrants in the front yard will encompass one-half of the side yard; likewise for the two quadrants for the back yard. One five-point composite will be obtained from each quadrant. Off-site residential lots with a yard area over one acre in size will be divided into quarter-acre quadrants. Five-point composite samples will be obtained from each quadrant. Right-of-ways associated with a property will be incorporated into the composite sampling scheme.

Four-point composite samples will be obtained from the drip zone of the house, if present, on each of the residential properties sampled. The composite sample will be obtained from between 6 and 30 inches from the exterior wall of the home and will be obtained from the approximate midpoint of each side of the house. A separate composite sample of soil from the downspout discharge areas will also be collected, if present, away from deteriorated paint in order to assess the potential for impact from airborne deposition of metals on the roof. Composite samples will be obtained from play areas within each portion of a property (e.g., back yard, front yard, side yard) from 0-1", 1-6", 6-12", 12-18", and 18-24". Two to five aliquots will make up a play area composite, depending on the number of play areas within a given portion of a property. Separate composite samples will be obtained for bare areas in the same manner as play areas. A final determination of the sampling requirements for these areas will be determined in the field in consultation with IEPA and/or their representatives.

Figure 2-6 outlines the potential sample locations for three yard scenarios as outlined in the Lead Guidance. Soil samples will be obtained from 0 to 1 inch, 1 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches below ground surface (bgs). Deeper soil samples will be obtained and analyzed on a case-by-case basis (e.g., if visible plant-related material is observed at 24 inches bgs). The deeper samples will be obtained from the soil underlying the visible plant-related material.

Discrete Soil Samples

In addition to the composite samples, discrete samples will be obtained from gardens, if present, on the residential property. One discrete soil sample location will be selected for every

100 square feet of garden area on a property. Garden soil samples will be obtained from 0 to 6 inches, 6 to 12 inches, 12 to 18 inches, and 18 to 24 inches bgs. Deeper soil samples will be obtained and analyzed on a case-by-case basis (e.g., if visible plant-related material is observed at 24 inches bgs). The deeper samples will be obtained from the soil underlying the visible plant-related material. If raised garden beds are encountered, sampling will continue until the top 12 inches of native soil is sampled or to a depth of 2 feet below the normal ground surface, whichever is less.

Additional Sample Collection Guidelines

Because one of the goals of the Pilot Study is to determine the concentration of HCOPCs in soil that could have potentially been a result of former operations at the FPSA, to the extent feasible sample locations will be selected to avoid the potential impact from lead-based paints (LBPs) and other potential anthropogenic sources of lead. The sample collection guidelines are as follows:

- Sample locations will not be located within 5 feet from existing structures and at least 3 feet from the drip zone (excluding drip zone samples) to minimize the potential influences from LBP.
- To minimize the potential influence from lead sourced from automobile use, sample locations will be selected no closer than 10 feet from existing roads and paved parking lots and 3 feet from driveways.
- Soil samples will not be obtained from areas that are visually observed to be impacted by oil.
- Soil samples will not be obtained from below paved areas or structures.
- Soil samples will not be obtained from within 3 feet of garbage piles, compost piles, junk piles, burning barrels, and vehicles in repair.
- Soil samples will not be analyzed from areas of visible potential plant-related material (cinders, slag, etc.) because these materials will automatically be removed during Design Study implementation. If encountered, these areas will be documented on a property sketch and on the Property Evaluation Form included in Appendix B. In addition, digital photographs of the area will be taken and soil borings will be advanced to visibly determine the approximate depth and extent of the potential plant-related material.

Based on the following assumptions, an estimated 1,475 soil samples will be collected and analyzed during the Pilot Study:

- Access is obtained from 50 properties,
- One-fourth of the proposed properties have a total yard area less than or equal to 5,000 square feet and one side yard;
- One-fourth of the proposed properties have a total yard area less than or equal to 5,000 square feet and no side yard;
- One-half of the proposed properties have a total yard area greater than 5,000 square feet;

- One-fourth of the yards contain bare and/or play areas;
- One-half of the yards contain a garden less than 100 square feet in size;
- All properties have drip line samples, and
- All properties have downspout samples.

The soil sampling will be conducted as outlined in the Field Sampling Plan (FSP) included in Appendix C.

2.4 Analytical Methods

The soil samples collected during the Pilot Study will be analyzed for the HCOPCs identified in the Design Study and subsequent correspondence with IEPA. The HCOPCs include antimony, arsenic, barium, cadmium, total chromium, cobalt, copper, iron, lead, manganese, mercury, thallium, and zinc. Soil samples will also be obtained for analysis of pH.

Soil samples will be analyzed at a fixed-base laboratory using Contract Laboratory Program (CLP) Method ISM 01.3 or most recent method. Laboratory analysis for hexavalent chromium will be completed using EPA Method 7196. Stage 3 validation will be performed on the first 10 data packages and 1 in every 20 data packages, thereafter, and Stage 2A validation will be completed for the remaining data packages. The specifications on the analytical methods, sample containers, preservatives, holding times, and quality assurance/quality control procedures are outlined in the Quality Assurance Project Plan (QAPP) Addendum included in Appendix D.

In addition to the laboratory analysis, soil samples will also be analyzed for HCOPCs using XRF technology following USEPA SW-846 Method 6200 (USEPA, 2007) to determine the correlation of the XRF instrument to the laboratory data. The XRF analysis will be performed using the Niton FXL 950 by Thermo Scientific field portable XRF analyzer. The XRF methodology is included in the attached QAPP Addenda. The data obtained from the fixed laboratory will be statistically compared to the data obtained from the XRF following the procedures outlined in the RAL Report (ENVIRON, 2011).

2.5 Soil Sieving

To evaluate if the lead concentration in the fine soil fraction is more representative of potential exposure to lead in soil from ingestion, both total and fine fraction soil samples will be obtained and analyzed for lead. Approximately 20-percent of the soil samples obtained from the 0 to 1-inch and 1 to 6-inch depth intervals will be analyzed for the fine fraction by drying the samples (if necessary), passing the soil through a No. 60 (250 micrometer) sieve, and collecting and analyzing the sieved soil. As presented in the Lead Guidance (USEPA 2003), if paint chips are present in the soil, they will be included in the fine fraction sample by breaking up the paint chips and forcing them through the sieve. Both the total and fine (sieved) soil samples will be analyzed for lead by CLP and XRF methods.

Once the properties identified for sampling are randomly selected and access agreements are obtained, the locations where soil sieving will be performed will also be determined randomly using the "randbetween" function in Microsoft Excel. Using the assumptions above for the

number of soil samples, approximately 55 soil samples from the 0 to 1-inch and 1 to 6-inch intervals (approximately 110 total) will undergo sieving and analysis.

2.6 Hexavalent Chromium Evaluation

If the chromium detected in off-site soil is present in the trivalent form, chromium would not be included as an HCOPC; therefore, an analysis will be performed using soil samples from OU3 obtained from material within 5 feet of ground surface with the highest total chromium concentrations to evaluate the speciation of chromium at the site. The locations of the highest total chromium concentrations measured within 5 feet of ground surface in OU3 are as follows:

Sample Location	Sample Depth (feet bgs)	Total Chromium Concentration (mg/kg)	Sample Location	Sample Matrix
SL-D-1	0-0.5	1,010	Western Area	Slag
SL-D-2	0-0.5	100	Western Area	Slag
SL-E	0-0.5	37	Eastern Area	Slag
J-8	3.5-5	37	Slag Pile Area	Slag
C-4	2.5-5	34.9	Lithopone Ridges	Lithopone
SL-G	2-3	33.3	Western Area	Lithopone
SL-B	0-0.5	32	Slag Pile Area	Slag
DPTP-120	0-2	31.9	Former Municipal Dump	Slag
F-3	0.5-5	31.6	Eastern Area	Fill

Key:

mg/kg = milligrams per kilograms

To evaluate the speciation of the total chromium, a soil sample will be obtained from the general location and sample depths of the above sample locations for laboratory analysis of total and hexavalent chromium. The OU3 sample locations are shown on Figure 2-7. Additional details on the analytical methods (e.g., laboratory analyses and digestion methods, holding times) are summarized in the attached FSP and QAPP Addendum.

3 Schedule and Reporting

3.1 Schedule

The tasks described in this Pilot Study will commence 10 business days following receipt of IEPA approval. Prior to starting the field work, the DePue Group will obtain property access with assistance from the IEPA. Field activities will not begin until 30 to 50 access agreements have been signed. During the RAL evaluation, 1 to 1.5 residential properties were sampled per day. Up to three field crews of two will be utilized during the Pilot Study to shorten the sampling schedule, it is anticipated that the sampling will be completed within two to three weeks. However, one objective of the Pilot Study is to evaluate the assumptions included in the Design Study; therefore, the time projected for field sampling may require revision. The standard laboratory turnaround time is approximately 14 days for a Stage 2A laboratory report, and approximately 21 days for a Stage 3 laboratory report. Standard turnaround time for the data validation is three weeks.

3.2 Reporting

A Pilot Study summary report will be prepared and submitted to IEPA for review upon completion of the Pilot Study and receipt of the final data packages from the laboratory. The report will include a table of sample results, a sketch showing sample locations, an evaluation of sampling intervals, an evaluation of the potential to refine of the OU4 HCOPC list, the results of the hexavalent chromium evaluation, the adequacy of XRF technology, the evaluation of lead in the fine fraction and total samples, and the generalized depth of potential plant-related material. Additionally, the report will provide recommendations for the full-scale implementation of the OU4 Design Study.

4 References

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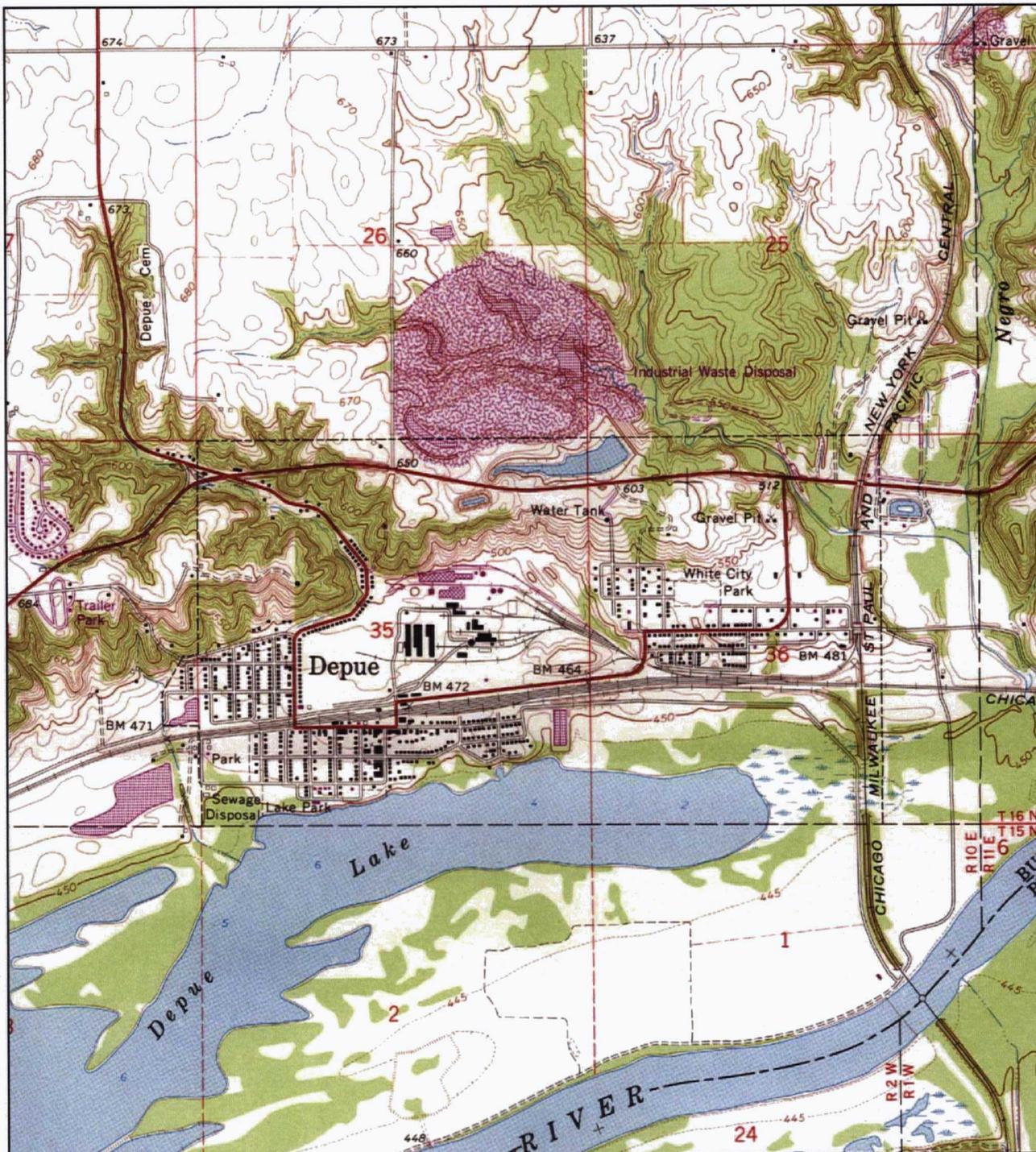
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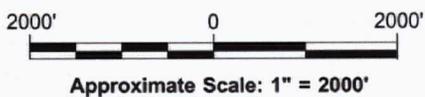
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Figures



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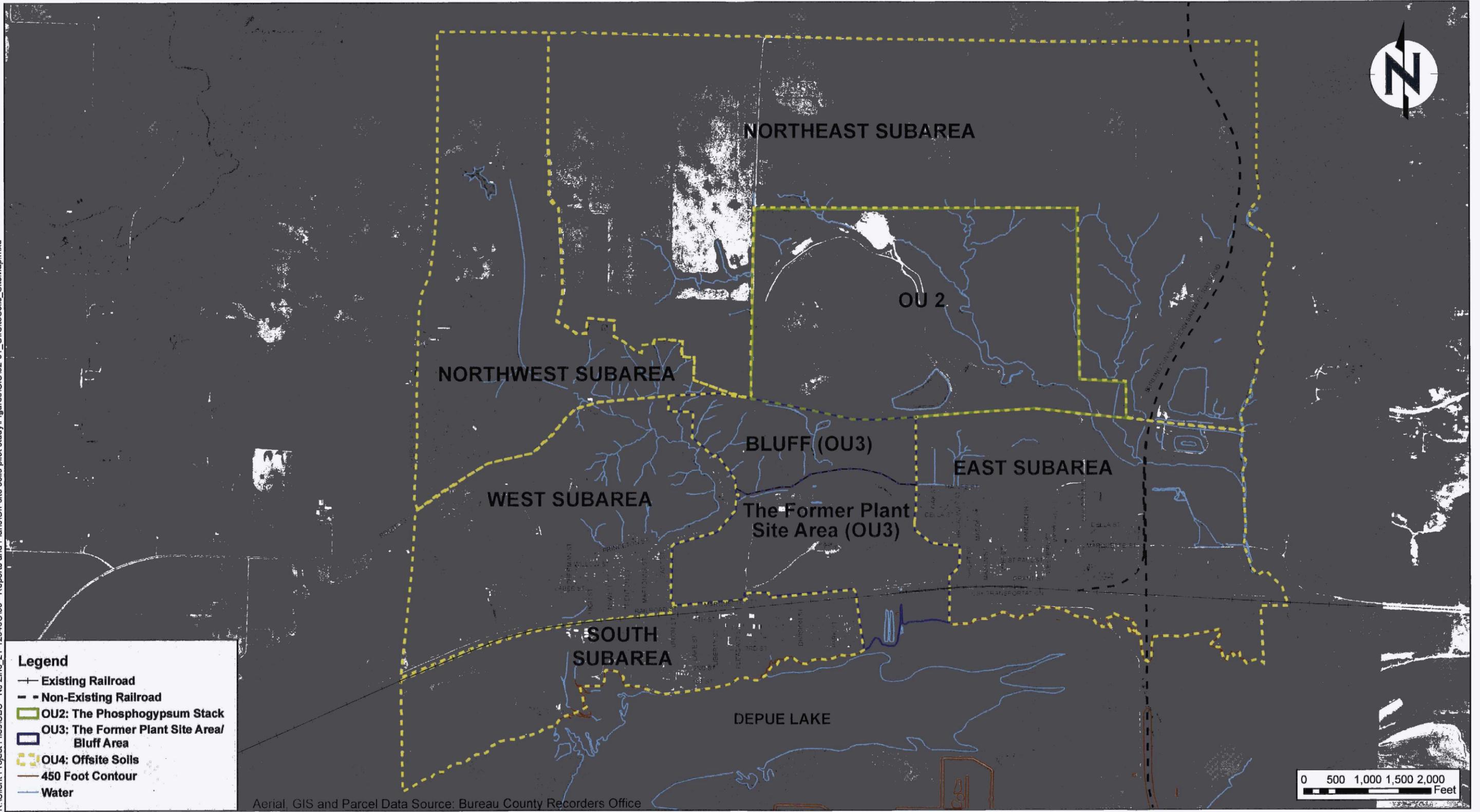


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DEPUE AREA VICINITY OU4 PILOT STUDY DEPUE SITE DEPUE, ILLINOIS

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**Site Map
OU4 Pilot Study
DePue Site
DePue, Illinois**

**Figure
2-1**

Drafted By: CCS/EMcC

DATE: 5/16/2013

PROJECT: 21-12046C

